

## **ABSTRACT OF THE DISCLOSURE**

A system and method for maintaining the temperature of a thermal transfer fluid at a selectable level within a wide temperature range, so as to operate a process tool in a chosen mode employing at least two cascaded stages, each operating with a different fluid in a separate refrigeration cycle. By interrelating energy transfers between parts of upper and lower stages, thermal efficiency is maximized and a smooth continuum of temperature levels can be provided. The refrigerants advantageously have vaporization points below and above ambient, for upper and lower stages respectively, and employs the upper stage for a constant refrigeration capacity, controlling the final temperature with the lower stage. The system allows for a further extension of range because the thermal transfer fluid can be heated for some process tool modes as the refrigeration cycles are run at low loads.